## The Spacecraft

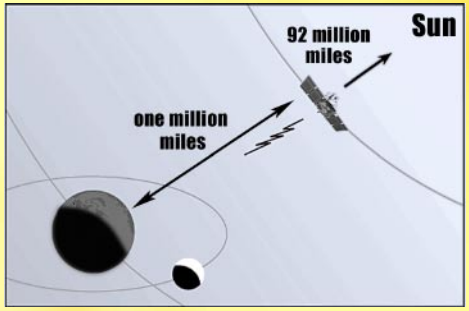
The SOHO (Solar & Heliospheric Observatory) project is a mission international cooperation between the European Space Agency (ESA) and NASA. The spacecraft is over four meters tall (12 feet) and its solar panels (not shown) extend over nine meters (25 feet). It weighs over two tons, about equal to the weight of a car. It is considered to be the most sophisticated solar observatory ever built.

*SOHO nearing completion*

## The Mission

SOHO was launched on December 2, 1995 and began operations several months later. The SOHO spacecraft was built in Europe and its instruments were developed by European and American scientists and engineers. NASA was responsible for the launch and it handles mission operations at Goddard Space Flight Center in Maryland. SOHO uses a sereies of large radio dishes around the world, which form NASA's Deep Space Network, to communicate with and track the spacecraft beyond the Earth's orbit. Operations should continue at least until 2007 and perhaps beyond.

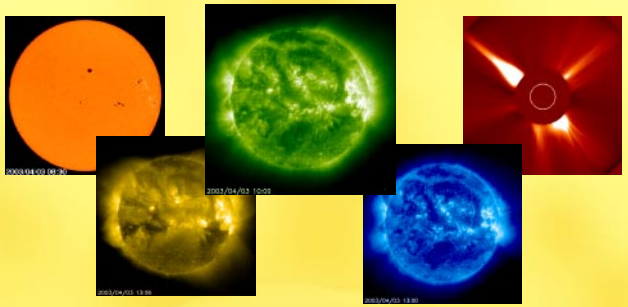
SOHO observes the Sun 24 hours a day and is positioned one million miles (1.5 million kilometers) sunward of Earth where its view is unobscured by weather or Earth's rotation. (The Sun is 93 million miles from Earth.) From space it can detect particles and observe the Sun in wavelengths of light that are blocked by our own atmosphere. SOHO has provided scientists around the world with unprecedented data and millions of images which may enable scientists to solve some of the most perplexing riddles about the Sun, including the heating of the solar corona, the acceleration of the solar wind, and the physical conditions of the solar interior.




inside flap

## What's on the web site?

What do the more than one million visitors a month find on our web site? Many want to see what the Sun is doing right now in movies or still images, from sunspots, to the lower corona in different wavelengths of ultraviolet light, to activity in the tenuous corona (its outer atmosphere).



Others come for these engaging features:

- **Pick of the Week**: the best image or movie is presented and explained
- **Hot Shots**: brings you the latest science highlights or topics of interest
- **Best of SOHO**: a collection of SOHO's top 100 images and movies
- **Classroom**: lessons plans and activities for teachers and students of all grade levels
- **Ask Dr. SOHO**: if you have a question about SOHO or the Sun, just write to us
- **Free Stuff**: you can download our SOHO screensaver, a paper model of the spacecraft, a collection of artistic Sun images, or request a copy of the SOHO: Exploring the Sun CD

**soho.nascom.nasa.gov or soho.estec.esa.nl**

## Related web r esour ces

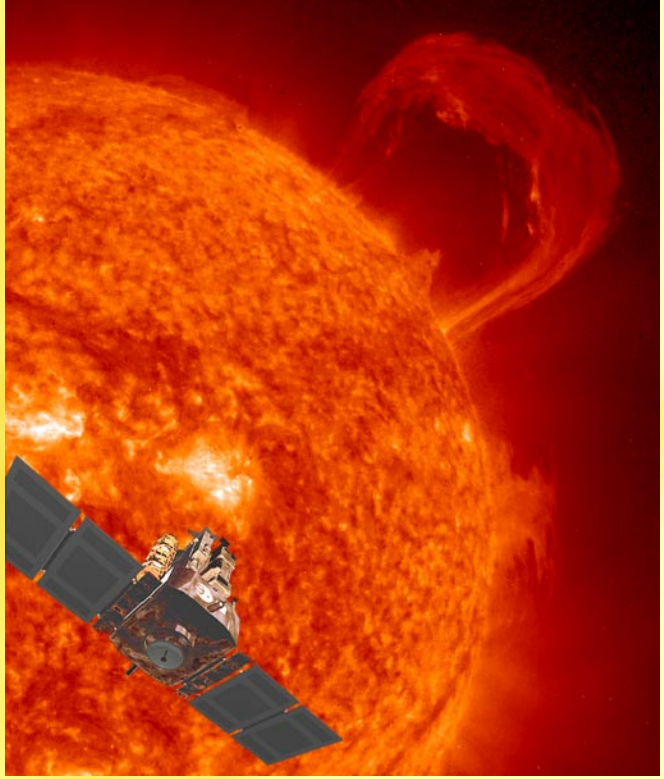
- Sun-Earth Connection Education Forum (SECEF)
  http://sec.gsfc.nasa.gov/
- NASA's Living with a Star program
  http://lws.gsfc.nasa.gov/
- The TRACE mission
  http://vestige.lmsal.com/TRACE/
- The Space Weather Bureau
  http://spaceweather.com

back

# SOHO

## The Solar and Heliospheric Observatory:

studying the Sun 24 hours a day from space



A joint mission of NASA
and
the European Space Agency

Goddard Space Flight Center
Code 682.3
Greenbelt, MD 20771

**soho.nascom.nasa.gov or soho.estec.esa.nl**

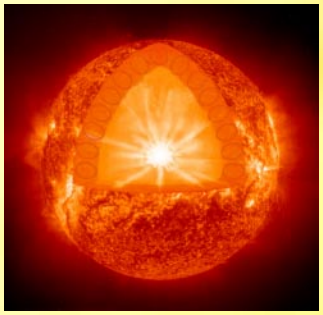
front

# Unveiling the secrets of the Sun

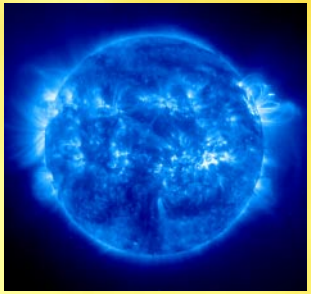
## SOHO' s Science Goals

SOHO's 12 instruments study many dimensions of the Sun:

• The **solar interior** – GOLF and VIRGO both perform uninterrupted series of oscillations measurements of the full solar disk. In this way, information is obtained about the solar nucleus. SOI/MDI measures changes on the surface of the Sun with extremely high resolution. This lets us obtain precise information about the Sun's convection zone - the outer layer of the solar interior, represented by the small circles below the surface.



• The **solar atmosphere** – SUMER, CDS, EIT, UVCS, and LASCO constitute a combination of telescopes, spectrometers and coronagraphs that observe the Sun's hot atmosphere (the corona) that extends far above the visible surface. They measure the corona's temperature, density, composition and velocity and follow the evolution of the structures with high resolution.



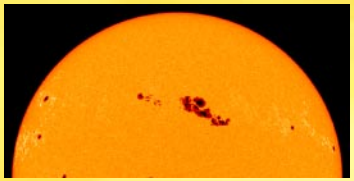
• The **solar wind** – CELIAS, COSTEP and ERNE analyze as they pass the instrument the charge state and isotopic composition of ions in the solar wind and of energetic particles generated by the Sun. SWAN makes maps of the hydrogen density in the heliosphere from ten solar diameters using telescopes sensitive to a particular wavelength of hydrogen.

left

## Space W eather? Of Course!

Why do we study the Sun? The Sun is the closest star to Earth – a star that is active and changing. A constantly changing magnetic field drives the changes that we can observe but do not yet fully understand. Sunspots are the visual evidence of intense areas of magnetic activity that keeps these regions cooler and visibly darker than the rest of the Sun.

The Sun's potential to disupt society increases as we come to rely more and more on technology.



*Very large group of sunspots*

SOHO is the "first alert" warning observer for solar storms, massive explosions of particles from the Sun. These occur quite frequently, though this varies with the Sun's 11-year cycle of activity. When an event is spotted, scientists can estimate a storm's speed and whether it is directed towards Earth. The cloud of particles takes two to three days to reach Earth, where this "space weather" can interfere with power systems, communications, navigational equipment, the health and safety of astronauts, and satellite operations.

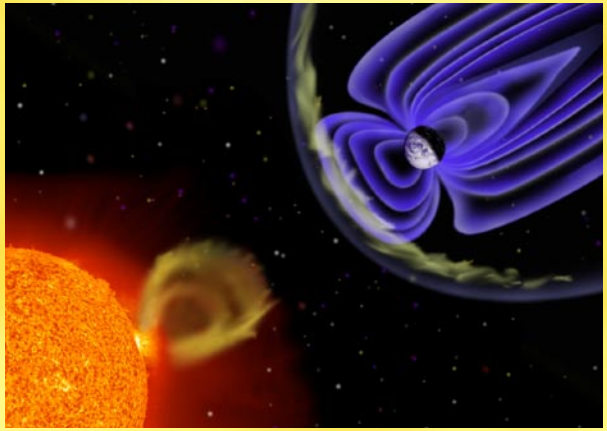


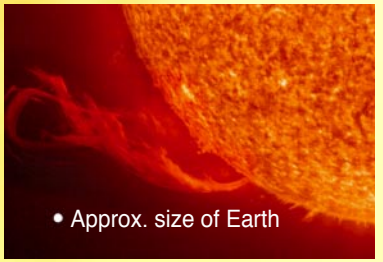
*Illustration of a solar storm blasting from the Sun and impacting Earth's magnetosphere*

On another front, the Sun's role in long-term climate change has not yet been determined, but data from SOHO will continue to be useful in this on-going scientific research.

center

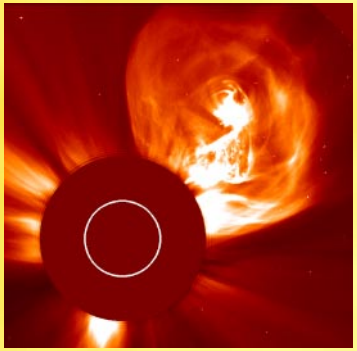
## The WOW Factor

Although most of the instruments on SOHO capture data only, the imaging instruments get the most attention from the public. And why not? SOHO has captured the most spectacular and detailed images of the Sun ever taken.

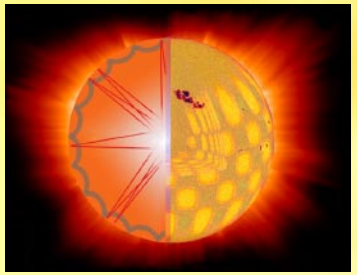


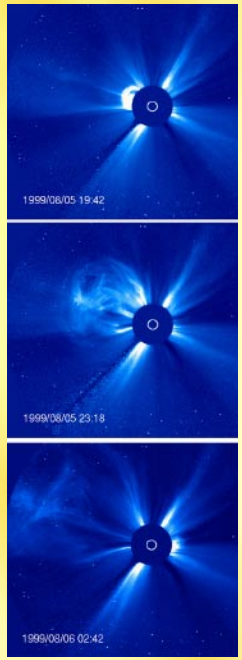

*Large solar prominence*

SOHO has captured: huge eruptive prominences as they break away from the Sun; powerful coronal mass ejections that blast billions of tons of matter into space at over a million miles per hour just as they leave the Sun (left); and, more distant images of these clouds as they extend and expand into space (right).



To cite one of its major scientific advances, SOHO has intensely studied the subtle pulsations on the Sun's surface to yield new information about its internal structure and processes (below).






*Coronal mass ejection blasting into space*

right